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HAI HARRISON A/E, INC.

MILITARY PR JECTS, ARCHITECTS, ENGINEERS, C NSTRUCTI N MANAGERS AND C NTRACT RS

ENTERPRISE S FTWARE-C MPUTERIZED C RP P RATE MANAGEMENT SYSTEMS

RESEARCH AND DEVELOPMENT: MILITARY DEFENSE, MEDICAL AND ENVIRONMENTAL PRODUCTS

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December 09, 2002

US DEPARTMENT OF COMMERCE
USPTO
US PATENT AND TRADEMARK OFFICE
Washington, D.C. 20231

Ladies and Gentlemen:

This concerns my Formal Patent Application to the USPTO. Title of Invention: "Harrison Free Standing Towers and Missile Defense System". The application is complete as it stands.

My Application Number is 10065872 (Provided by the USPTO Acknowledgement Receipt).

My USPTO code numbers are:
Customer Number: 34341
Authorization Code: LK4W-HZJI-TEQF
Referen e Number: 30314891
EFS ID: 20307 (Provided in th USPTO Acknowl dg ment Receipt)

I resp ctfully requ st that th following Attachments be included with my Utility Pat nt Filing referenced above. I imply could n t figure

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how t include the attach d fil with my application, so I used word in t c mpl te my Patent Sp cificati n, as r ferenced above.

Accordingly, the following attachments are included below:

Attachment A: Bibliography/List of References.
Attachment B: A discussion of gyroscopes.
Attachment C: Background Fax to the US Army.
Attachment D: Background Fax and Letter to US ARMY SPACE AND MISSILE DEFENSE COMMAND.

I consider this Patent Application to be very important to the national defense of the USA, as you can see from the attached material.

Would you please confirm receipt at your convenience. Thank you.

Sincerely,

Wilbur E. Harrison, P.E.
President

ATTACHMENTS OF APPLICABLE REFERENCED MATERIAL.

ATTACHMENT A

BIBLIOGRAPHY

Arnold, Ronald N., and Leonard Maunder, *Gyrodynamics and Its Engineering Applications*, New York and London: Academic Press, Inc., 1961.

Burger, W., and A. G. Corbet, Ship Stabilizers, *Their Design and Operation in Correcting the Rolling of Ships; A Handbook for Merchant Navy Officers,* London: Pergamon Press Ltd., 1966.

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Richardson, K. I. T., *The Gyroscope Applied*, London: Hutchinson's Scientific and Technical Publications, 1954.

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Schilovsky, P. P., *The Gyroscope: Its Practical Construction and Application*, New York: Chemical Publishing Corp. of N.Y., Inc., 1938.

www.mariner.connectfree.co.uk/html/gyro.htm Website about gyroscopes with diagrams and calculations.

Microsoft Word; Drive E; File: 2980A.doc & Diskette 104.

-------------------------- ATTACHMENT B -----------------------------

GYROSCOPE THEORY AND CALCULATIONS

Gyroscopes

email Mikey

Home / EM

Overview

Gyroscopes are a simple toy to many, yet they are poorly understood. This paper derives the mathematics of gyroscopes, and briefly discusses the relevance to the Plank's equation "E=h*υ*".

Gyroscope concepts

A gyroscope has three axes. First, a *spin* axis, which defines the gyroscope strength or *moment*. Let us call the other two the primary axis and the secondary axis. These three axis are orthogonal to each other.

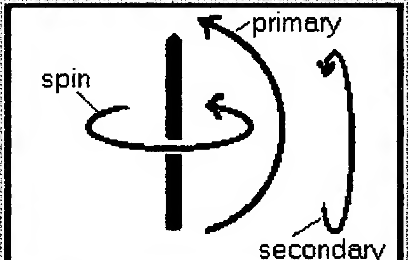

Figure 1: Gyro axes

The spin axis rotates around the vertical line. The primary axis rotates the whole gyroscope in the plane of the page, and the secondary axis rotates the gyroscope up-and-over into the page.

The spin axis is the source of the gyroscopic effect. The primary axis is conceptually the input or driving axis, and the secondary the output. Then if the gyroscope is spun on its spin axis, and a torque is applied to the primary axis, the secondary axis will precess. The primary axis appears infinitely stiff to the applied torque and does not give under it. This is the generally-recognised characteristic of gyroscopic behaviour.

It is important not to confuse the concepts of angular momentum and gyroscopic moment. When a mass 'm' moves in a straight line at velocity '**v**' it exhibits linear momentum (m.v). It is trivial to predict that if it is constrained to travel in a radius 'r' it will produce an angular momentum (m.v.r). However with the angular momentum an effect that could not have been predicted turns up - gyroscopic behaviour. The fact that in the larger world the two effects occur together and in simple proportion to each other does not mean that this is always the case - gyroscopic behaviour occurs without angular momentum in electron behaviour, even though the terms 'spin' and 'spin angular momentum' are still used for historical reasons, even though there is no direct evidence that the electron's mass or charge spins on its own axis. It may simply be that rotating an object exposes the gyroscopic moments of the elementary particles that make it up, possibly through the asymmetric relativistic effects created by the centripetal acceleration; some major experimental work is required in this area.

Angular momentum has the form "kilogram-meters^2 per second". Gyroscopic moment has the form "Newton-meters per Hertz", or torque required to produce a precession rate of one Hertz. For those familiar with dimensional analysis, both have the dimensions 'L^2M/T', which means only that they are related by a simple scalar number. However (as far as the author has been able to determine) the actual value has never been researched; it may be unity, it may not. Whatever the case, from here on I will ignore angular momentum and consider only the gyroscopic moment, regardless of how it is generated.

Basic gyroscope equations

The strength of a gyroscopic effect is termed the gyroscopic moment. I use the symbol 'G', in units "Newton-meters/Hertz". A higher moment requires more torque to precess at the same frequency, or for the same torque precesses at a lower rate.

Where a gyroscope receives torque on the primary axis and precession on the secondary, no work is being done. The torque 'T_P' on the primary axis has no precession associated with it, while the precession rate 'υ_S' on the secondary axis is...

$$\upsilon_S = T_P / G$$

...and has no torque associated with it. Since the rate of doing work on each axis is the torque times the precession *on that axis*, it follows that in this simple case no energy is involved.

Gyroscopes do not differentiate between primary and secondary axes - this is a purely artificial definition of my own. A torque on the secondary axis creates precession on the primary axis. Simultaneous torque on both axis will result in simultaneous precession. In this case each axes will have both torque (creating precession on the other axis) and precession (created by torque on the other axis). Then the rate of doing work 'P_P' on the primary axis is...

$$P_P = T_P.\upsilon_P / G$$

...and on the secondary...

$$P_S = T_S.\upsilon_S / G$$

Now by applying the conservation of energy...

$$_P = - P_S$$

i.e. the work done on one axis must appear on the other.

So far I have dealt purely with behaviour, but to go further we need to look at *why* it behaves this way - what mechanism is at work? Let us go through the basic operation where torque on one axis creates precession on the other (those familiar with electric motor theory will be familiar with the following ideas).

First apply a forcing torque to the primary axis; at this stage in the argument imagine that the primary axis presents no stiffness against the forcing torque. The secondary axis would precess at an infinite frequency, but for a limiting mechanism that comes into play; just as torque creates precession, so precession creates torque. So as the secondary axis precesses it creates a reverse torque T_{PF} on the primary axis...

Using the equations

Now look at the special case of a gyroscope operating in an external linear field that serves to invert it through exactly 180 degrees. For example, when a table-top gyroscope whose bottom pivot point is fixed starts pointing upwards, the linear vertical gravitational field of the Earth acts to invert it.

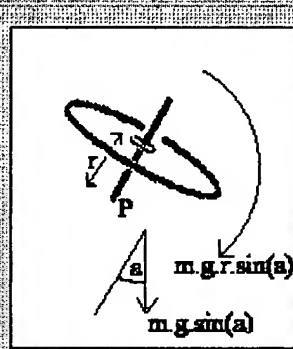

Figure 2

The gyroscope mass 'm' acts through the centre of gravity of the gyroscope. The vertical force is...

$$m.g.\sin(a)$$

...where 'g' is the gravitational constant of 9.81 meters per second. The torque around the gyroscope pivot point 'P' - and hence around the centre of mass - is...

$$T_P = m.g.r.\sin(a)$$

...where 'r' is the radius from the pivot point to the centre of mass.

This creates an *instantaneous* precession F_S that in Figure 2 will cause the gyroscope to precess out of the page at the top of the picture. The *instantaneous* rate of precession is...

$$\upsilon_S = m.g.r.\sin(a) / G$$

Now the reason for emphasising that this is the instantaneous rate, is that T_P is not a simple torque under the external linear field. As the gyroscope precesses out of the page, the angle the field makes with the gyroscope rotates with the precession. The end result of this is to cause the gyroscope's precession to be truncated into a circle whose circumference is normal to the field. The circumference of this circle is shortened to...

$$r.\sin(a)$$

...while the full precessional circumference would be simply 'r'. This means that it takes the gyroscope less time to trace out the circular path, so the actual foreshortened precession rate is corrected to...

Gyration

A final interesting characteristic appears when you put a spring on the secondary axis. As you drive the primary axis the secondary axis will at first precess and the primary axis will be stiff, but as the spring winds up you will find the precession slow down and stop, and as a result the primary axis will give way more and more until it rotates freely. This behaviour is that of an inertial torque on the primary axis. Equally, if you put an inertial torque on the secondary axis the primary axis will behave like a spring torque. This behaviour, where inertial torque is converted into spring torque and vice-versa, is termed *gyration*.

Conclusion

The fascinating behaviour of gyroscopes can be seen from the foregoing. It can also be seen that the electron's gyroscopic moment dominates the whole of Quantum Mechanics through Plank's constant, which is simply twice the gyroscopic moment.

ATTACHMENT C

Applicable FAX TO AND FROM MS.LESLIE DUNCAN OF SMDC (US ARMY SPACE AND MISSILE DEFENSE COMMAND)

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FACIMILE TRANSMISSION COVER SHEET

Date: October 10, 2002

TO: Ms. Leslie Duncan
___SMDC Contracting and Acquisition Management Office
Fax: 1-256-955-4240
Telephone: 1-256-955-4027
LOCATI N: US ARMY SPACE AND MISSILE DEFENSE COMMAND (SMDC)
CONTRACT AND ACQUISITION MANAGEMENT OFFICE
P. . BOX 1500, HUNTSVILLE, ALABAMA 36807-3801

FROM: Wilbur E. Harrison
FAX: 410-747-9936